

# (12) UK Patent Application (19) GB (11) 2 176 950 A

(43) Application published 7 Jan 1987

(21) Application No 8614962

(22) Date of filing 19 Jun 1986

(30) Priority data

(31) 8515831 (32) 21 Jun 1985 (33) GB

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H01R 9/09 // 9/16

(52) Domestic classification (Edition I):

H2E DAK

U1S 2087 2088 H2E

(56) Documents cited

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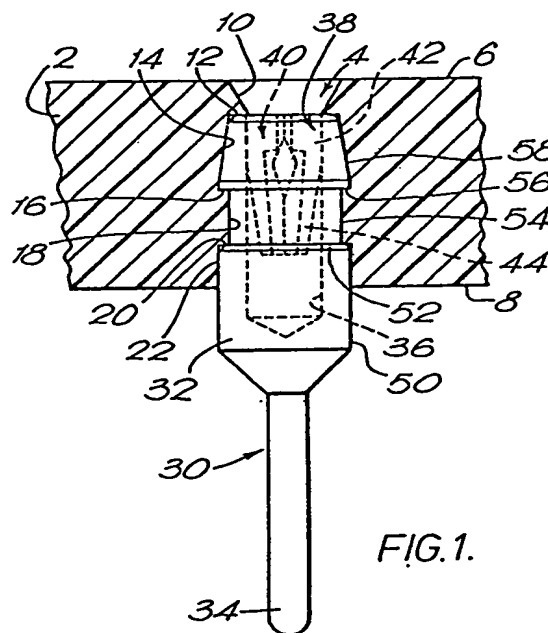
US 4359258

(58) Field of search

H2E

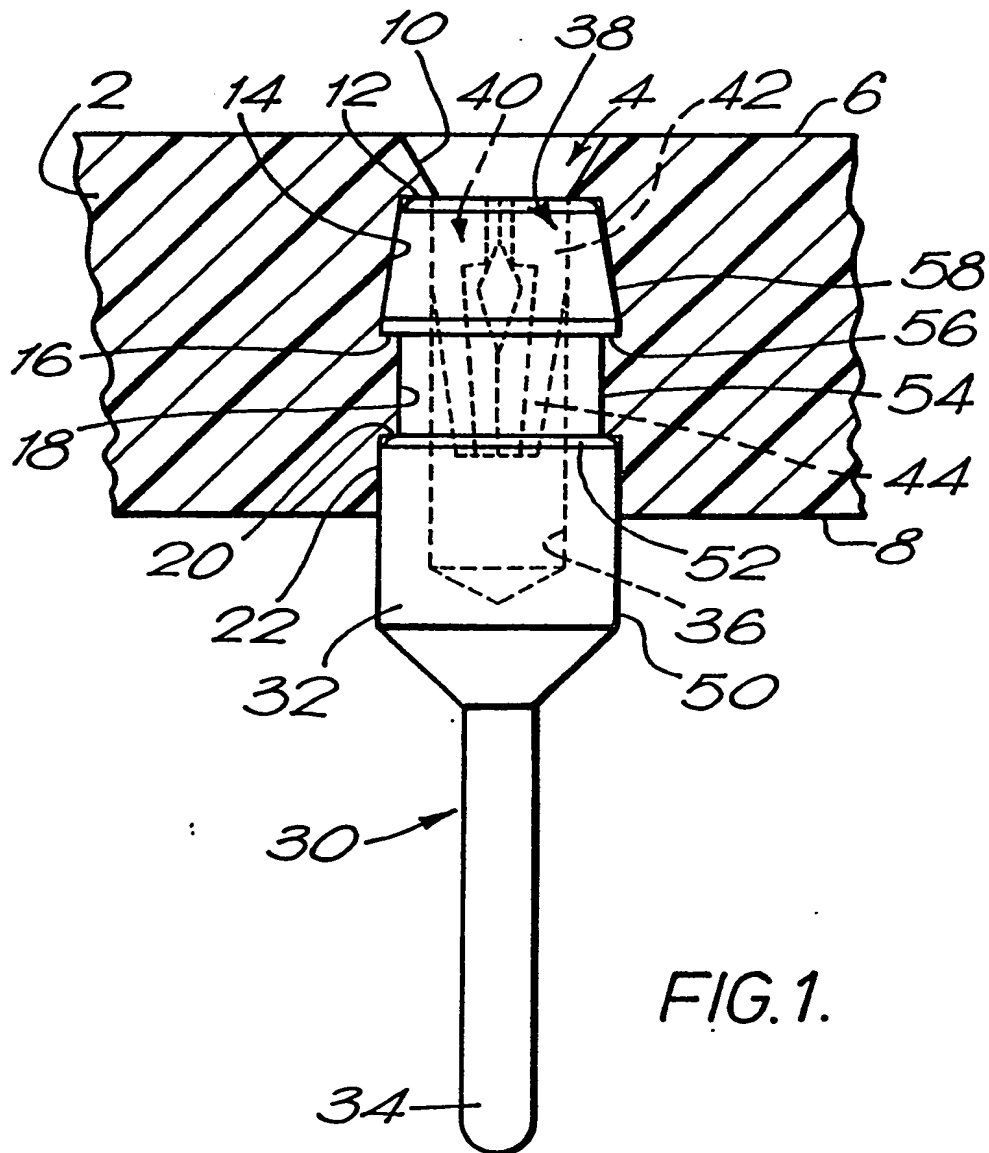
(54) Socket assembly for mounting in  
P.C.B. hole

(57) A socket assembly for mounting on a PCB and receiving the terminal pins of a semiconductor chip package avoids problems of faulty fittings of bent terminal pins by spacing the top of each electrical socket (32) within a respective bore (4) in p.c.b. (2) a predetermined distance from the top surface (6) of the p.c.b. The upper part (10) of the bore tapers inwardly. Each socket (32) is assembled within a bore (4) by forcing from the bottom surface (8) so that a conical head portion (58) makes a force-fit in a mating conical portion (14) of the bore. Bent pins of i.c. packages are aligned by taper (10) or if badly bent do not enter the bore, do not make contact with the socket, and show up in testing.



GB 2 176 950 A

1/1



## SPECIFICATION

## Socket assembly

5

The present invention relates to a socket assembly of the type for mounting semiconductor packages.

Semiconductor packages generally comprise a housing encapsulating a semiconductor chip which is electrically connected with a multiplicity of conductive pins which constitute electrical terminals extending from the semiconductor package. In order to mount such a package on a printed circuit board it is known to provide a socket assembly which is fixed in position on the circuit board so that the package can be press-fitted into the socket assembly. Such socket assemblies generally comprise an insulating housing mounting a multiplicity of conductive contacts which extend from the bottom surface of the housing for location in the printed circuit board. Each contact comprises a socket part which extends through the housing from the top surface of the housing in order to receive a respective terminal of a semiconductor package.

The problem with such socket assemblies is that they can give rise to circuit unreliability. For example if a semiconductor package having a bent terminal pin is mounted by press-fitting the package onto the socket assembly, the bent terminal pin may not properly engage with the socket part of the respective contact. However, during testing of the circuit the semiconductor package having the bent terminal pin may not be rejected because the bent pin may make intermittent electrical contact with the top part of the contact of the socket assembly. Nevertheless such intermittent contact may result in the circuit failing during use.

With a view to overcoming this problem the present invention provides a socket assembly for mounting on a printed circuit board or the like and for receiving a semiconductor package, the socket assembly comprising an insulative body having opposing top and bottom surfaces and a plurality of bores extending through the body from the top surface to the bottom surface, an electrically conductive contact member being mounted in each bore, each contact member comprising a terminal portion extending from the bottom surface of the body and a socket portion mounted within the bore for receiving and making electrical connection with a respective terminal pin of the semiconductor package, the upper end of the contact member being displaced from the top surface of the insulative body so as to be recessed within the respective bore.

As preferred the bore tapers inwardly from the top surface of the body to the upper end of the contact member.

Thus in accordance with the invention, any badly fitting contact on a semiconductor package such as a bent terminal pin will either be forced into alignment with the respective contact member of the socket assembly during press-fitting or alternatively no contact will be formed between the bent pin and the respective contact member due to the recessing of the contact member within the bore and the presence

of insulative material between the top of the contact member and the top surface.

A preferred embodiment of the invention will now be described with reference to a single figure of drawings which shows a cross-section through a socket assembly in accordance with the present invention.

Referring to the single figure of drawings, a socket assembly for connecting a semiconductor package to a printed circuit board comprises an insulative body 2 of glass filled polyester having a plurality of bores 4 (only one of which is shown) extending between a top surface 6 and a bottom surface 8. Each bore 4 comprises an upper portion 10 tapering inwardly from surface 6, a radial shoulder portion 12 interconnecting tapering portion 10 with a further tapering portion 14 which tapers conically in the opposite direction to portion 10, a radial shoulder portion 16 which interconnects tapering portion 14 with a further bore portion 18 of a cylindrical shape, a further shoulder portion 20 interconnecting bore portion 18 with a widened cylindrical bore portion 22.

An electrical brass contact member 30 is force-fitted within bore 4 and in contrast to known designs is force-fitted from the bottom surface 8 of the insulative body in contrast to known designs wherein the contact member is normally force-fitted from the top surface. Electrical contact member 30 comprises a socket portion 32 and a terminal pin portion 34. Terminal pin portion 34 is designed to be connected to a printed circuit board or the like. Socket portion 32 has an interior parallel sided bore 36. Within bore 36 is force-fitted an electrical contact member of beryllium copper 38 comprising four leaf spring arms 40 each having a widened top portion 42 and inwardly extending leg portions 44 which are secured together by a crimping operation at their lower ends. The enlarged portions 42 make a force-fit within bore 36 at the top of bore 36 and the four arms serve to receive therebetween an electrical terminal pin of a semiconductor package (not shown).

The external surface of the socket portion 32 comprises a lower cylindrical portion 50, a radial shoulder portion 52, an intermediate tubular cylindrical portion 54, a further shoulder portion 56 and a tapering portion 58 which tapers conically towards the top surface 6.

Thus when the electrical contact member is force-fitted within the bore 4, the upper conical portion 58 engages within tapering bore portion 14 so that the top of the contact member abuts shoulder 12 and the shoulder 16 of the bore engages behind shoulder 56 of the contact member in order to firmly retain the contact member within the bore. In this position portion 54 of member 30 engages within bore portion 18 and portion 50 of member 30 engages within widened bore portion 22 with shoulder 52 engaging shoulder 20.

It will be noted that the top of the electrical contact member is spaced from the top surface 6 of the insulative body by the inwardly tapering bore portion 10 and this serves as a lead in area for a terminal pin of a semiconductor package. Should such a semiconductor package pin be bent out of alignment with the bore, the pin upon press-fitting of the package to the socket assembly will either be forced completely

of the bore 4 so that no electrical contact is formed or alternatively the pin will be eased back into correct alignment by reason of engaging the tapering walls of the recessed portion 10 so that the contact pin is guided to make electrical contact with the electrical contact 42.

It may thus be seen that the socket assembly constructed in accordance with the invention is especially useful with circuits which are automatically assembled and tested since should there be any misalignment or damage to a terminal pin of a semiconductor package there will be immediate rejection upon initiation of an automatic testing technique.

## 15 CLAIMS

1. A socket assembly for mounting on a printed circuit board or the like and for receiving a semiconductor package, the socket assembly comprising an insulative body having opposing top and bottom surfaces and a plurality of bores extending through the body from the top surface to the bottom surface, an electrically conductive contact member being mounted in each bore, each contact member comprising a terminal portion extending from the bottom surface of the body and a socket portion mounted within the bore for receiving and making electrical connection with a respective terminal pin of the semiconductor package, the upper end of the contact member being displaced from the top surface of the insulative body so as to be recessed within the respective bore.
2. An assembly as claimed in claim 1 wherein the bore tapers inwardly from the top surface of the body to the upper end of the contact member.
3. An assembly as claimed in claim 2 wherein the bore has a first annular shoulder adjacent the lower end of the inwardly tapering portion of the bore for abutting the end of the contact member.
4. An assembly as claimed in claim 2 wherein the bore has an outwardly tapering portion extending from the first annular shoulder and terminating in a second annular shoulder, and wherein the socket portion of the contact member has a mating conically tapered end portion for making a force-fit between the first and second annular shoulders by being forced into the bore from the bottom surface of the socket assembly.
5. An assembly as claimed in claim 1 wherein the socket portion has a bore therein which is disposed an electrical contact member for engaging a terminal pin of a semiconductor package and comprising a plurality of electrically conductive flexible arm members.
6. A socket assembly for mounting on a printed circuit board or the like and for receiving a semiconductor package, substantially as described with reference to the accompanying drawing.